Pension Funds and Social Security
Lecture notes

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Week 1
Social Insurance, Social Security and Welfare

A first distinction

First, we need to define what these words mean and make a distinction between them. Some definitions from the web:

- **Social Security**, as a whole, refers to any government system which provides money and benefits to people in need - which usually means people with little or no income.
- **Social Insurance** is a type of such a system, where the people pay into the insurance scheme to mitigate the risk (of unemployment, disability, old age).
- **Welfare** would be another aspect of such a system, where people will receive benefits based on eligibility (need), rather than cause (unemployment).

While social insurances are to a large degree paid for by the participants and often additionally supported by government subsidies, welfare is usually entirely dependent by government funds.

Social Security

Other definitions:

- **Government program** aimed at providing basic needs to citizens who are retired, unemployed, or unemployable due to a disability or disadvantage. It is funded usually by mandatory payroll contributions from both the employees and the employers, and from the government's tax revenue.
- The principle or practice or a program of public provision (as through social insurance or assistance) for the economic security and social welfare of the individual and his or her family.
• A U.S. government program established in 1935 to include old-age and survivor insurance, contributions to state unemployment insurance, and old-age assistance.

Social security is any government system that provides monetary assistance to people with an inadequate or no income.

Social security is enshrined in Article 22 of the Universal Declaration of Human Rights, which states: “Everyone, as a member of society, has the right to social security and is entitled to realization, through national effort and international cooperation and in accordance with the organization and resources of each State, of the economic, social and cultural rights indispensable for his dignity and the free development of his personality.”

In its 1952 Social Security (Minimum Standards) Convention (nr. 102), the International Labour Organization (ILO) defined the traditional contingencies covered by social security as including:

• Survival beyond a prescribed age, to be covered by old age pensions;
• The loss of support suffered by a widowed person or child as the result of the death of the breadwinner (survivor’s benefit);
• Responsibility for the maintenance of children (family benefit);
• The treatment of any morbid condition (including pregnancy), whatever its cause (medical care);
• A suspension of earnings due to pregnancy and confinement and their consequences (maternity benefit);
• A suspension of earnings due to an inability to obtain suitable employment for protected persons who are capable of, and available for, work (unemployment benefits);
- A suspension of earnings due to an incapacity for work resulting from a morbid condition (sickness leave benefit);
- A permanent or persistent inability to engage in any gainful activity (disability benefits);
- The costs and losses involved in medical care, sickness leave, invalidity and death of the breadwinner due to an occupational accident or disease (employment injuries).
- People who cannot reach a guaranteed social minimum for other reasons may be eligible for social assistance (or welfare, in American English).

Terminology in this area is somewhat different in the United States from in the rest of the English-speaking world.

- The general term for an action program in support of the wellbeing of poor people in the United States is welfare program, and the general term for all such programs is simply welfare. In the United States, the term Social Security refers to the US social insurance program for all retired and disabled people.
- Elsewhere the term is used in a much broader sense, referring to the economic security society offers when people are faced with certain risks.

Social Insurance

Other definitions:

- Form of compensation provided and controlled by a government for elderly, disable, or unemployed people. Acceptance in a social insurance program is not guaranteed and individuals seeking to be covered have to meet certain requirements.
• Social insurance may come in the form of healthcare or monetary compensation. Medicaid, Medicare, and unemployment compensation are all examples of social insurance programs in the United States.

• Protection of the individual against economic hazards (such as unemployment, old age, or disability) in which the government participates or enforces the participation of employers and affected individuals.

Social insurance is any government-sponsored program with the following four characteristics:

• the benefits, eligibility requirements and other aspects of the program are defined by statute;
• explicit provision is made to account for the income and expenses;
• it is funded by taxes or premiums paid by (or on behalf of) participants (but additional sources of funding may be provided as well);
• the program serves a defined population, and participation is either compulsory or heavily subsidized.

**Welfare**

Other definitions:

• Government support for the poor and otherwise disadvantaged members of the society, usually through provision of free and/or subsidized goods and services.

• The various social services provided by a state for the benefit of its citizens.

Welfare is the provision of a minimal level of well-being and social support for citizens and other eligible residents without sufficient current means to support basic needs.
In most developed countries, welfare is mainly provided by the government from tax revenue, and to a lesser extent by NGOs, charities, informal social groups, religious groups, and inter-governmental organizations.

The welfare state is a concept of government in which the state plays a key role in the protection and promotion of the social and economic well-being of its citizens. It is based on the principles of equality of opportunity, equitable distribution of wealth, and public responsibility for those unable to avail themselves of the minimal provisions for a good life. The general term may cover a variety of forms of economic and social organization.

Definitions synthesis

**Social security** is characterized by:

- an assistance scheme (partially or totally funded by government's tax revenue);
- the program serves all citizens in need;
- it covers different situations (see ILO list).

**Social insurance** is characterized by:

- an Insurance scheme to mitigate the risk (benefits are funded through contribution);
- the program serves a defined population (not all the citizens);
- the benefits are usually limited to old age pension, disability benefit, survivor’s benefit.

**Welfare** is characterized by:

- the fact that people will receive benefits based on eligibility (need, poverty), rather than cause;
• is mainly provided by the government from tax revenue;
• it offers various social services.

Social Insurance vs Private Insurance
The benefits provided by Social Insurance as well as those provided by Social Security are often characterized by some aspects that distinguish them from the typical private insurance studied in actuarial mathematics. Otherwise some aspects are common.

Similarities
• in both of them there is pooling of risks;
• they need a specific definition of the benefits provided;
• as well as specific definitions of eligibility rules and the amount of coverage provided;
• both of them are based on an insurance scheme, so premium (or contribution) are required to meet the expected costs of the benefits.

Differences
• In private insurance a greater emphasis is given on equity between individual, while in social insurance programs a greater emphasis is placed on the social adequacy of benefits for all participants.
• Participation in private insurance programs is often voluntary; if the purchase of insurance is mandatory, individuals usually have the choice of the insurer. Participation in social insurance programs is generally mandatory; if participation is voluntary, the cost is heavily subsidised to ensure essentially universal participation.
• Individually purchased private insurance generally must be fully funded. Social insurance programs are often not fully funded (Most systems of social insurance are funded on an ongoing basis without reference to future
Social Insurance programs often incorporate solidarity between generations and between “lucky” and “unlucky” people.

By focusing our attention on technical aspects, in social insurance there are situations where the benefits are on a group of people rather than on a single person (for example a family).

Furthermore, an insured can be entitled for benefit not only in case of death/survival but also for other events (disability, unemployment, ...).

To deal with the first problem we consider *multiple-life contracts*.

While to deal with the second problem we introduce *multiple-decrement theory*. 
Pension plans

Introduction
A pension plan is a financial contract between a pension provider and the member(s) of the plan, established for the purpose of providing an income in retirement for the member(s).

Many pension plans also provide other types of benefit, sometimes called *ancillary benefits* (e.g. the provision of life assurance).

Categorizations of pension plans

**Coverage**
First, there is the question of who can belong to the plan. At one extreme we have *single-member plans*, which are often insurance contracts taken out by an individual for the purpose of saving for retirement.

Then we have *group pension plans*, which cover a number of individuals who share a common interest (e.g. they work for the same employer, they belong to the same category of workers, they live in the same region).

Lastly, we have *state pension plans*, also referred to as social security plans, which usually aim to cover the citizens of an entire country. An important feature of such plans is that membership is usually compulsory for people who work in the country.

**Benefits and contributions**
Every pension plan must have rules for the calculation of benefits (the money paid from the plan to its members) and contributions (the money paid into the plan by its members and/or their employer).

There are basically two types of plan: a *defined-benefit plan* and a *defined-contribution plan*. 
A defined-benefit plan is one where there is a fixed rule for calculating the benefits. The simplest type of defined-benefit plan would be the payment of a flat-rate pension of \(€ x\) per month to all members when they reach a specified retirement age. More usually, the pension is calculated according to a formula based on the member’s salary and service (period of pensionable employment) before retirement. The contributions paid into the plan are whatever is required to meet the cost of providing the defined benefits, and have to be estimated periodically by the plan actuary. They usually vary over time.

A defined-contribution plan is one where there is a fixed rule for calculating the contributions paid into the plan. The simplest approach would be to require a contribution of \(€ x\) per month for each member until retirement.

More usually, the contribution is calculated as a defined percentage of the member’s salary. In most defined-contribution plans, each member has an individual account in which the contributions paid for the member accumulate until retirement. The fund at retirement can then be used to purchase a whole-life annuity.

**Funding**

The funding of a pension plan refers to the timing of the payment of contributions to the plan.

A *funded* plan is one in which the cost of providing a member’s pension is met by accumulating a fund over the same member’s period of service before retirement. A funded plan, therefore, accumulates a pool of assets on behalf of the working members (or active members) in order to provide for their future benefits. An important issue is how these assets should be invested.

An *unfunded* plan is one in which the cost of pensions is met directly by the contributions paid at the same time. Such a plan, therefore, involves a transfer of money between different generations of members: the contributions of the active
members pay for the pensions of those who have retired. There is no pool of assets in an unfunded plan, because all of the contributions are immediately used to pay benefits. Unfunded plans are also referred to as **pay-as-you-go** plans.

It is possible for a pension plan to be **partially funded**, which means that the contributions to the plan are timed so as to accumulate a fund which is always significantly less than the present value of the benefits accrued from past service.

**Single-Member Plans**

These are the easiest types of pension plan to understand and are similar to an individual insurance product. An employee saves for retirement by paying regular contributions into his/her own personal fund. At retirement, the accumulated value of the fund is used to purchase a whole-life annuity from an insurance company. If desired, the member can also purchase life assurance benefits, to provide an income for the spouse on death before and/or after retirement.

Single-member plans are therefore funded plans. A fund is accumulated and must be invested in suitable assets. Often, the plan consists of a contract with an insurance company.

In theory, a single-member plan could be defined contribution or defined benefit. In practice, it would be difficult for a member to guarantee a defined benefit without being prepared to increase contributions greatly should investment returns on the fund be less than expected. So, most single-member plans are defined contribution, and the pension at retirement will depend on:

- the accumulated investment returns up to retirement;
- the management expenses deducted from the fund up to retirement;
- the terms on which a whole-life annuity can be bought at retirement.
**Group Pension Plans**

Group pension plans can be either defined contribution or defined benefit.

The type of plan favoured varies from country to country: the U.S. and U.K. have traditionally had both types of plan, although recently there has been a move towards defined-contribution plans in both countries. In Italy, defined benefit plans were more widespread in the past, since 1993 all new plans have been defined contribution plans.

Group pension plans are normally set up by an employer on behalf of its employees, as part of their remuneration packages. It is customary for the employer to pay a substantial part of the contributions to the plan. The employees may also have to pay contributions, but in non-contributory plans the employer meets 100% of the cost.

Defined-contribution group plans are nearly always managed like a collection of single-member plans. The plans are funded, and the contributions paid are notionally segregated into separate accounts for each member. The members share the investment returns and expenses of the group fund and, at retirement, can use their personal account to purchase a whole-life annuity. Defined-contribution plans run in this way are called *money purchase plans*, because each member uses the assets accumulated in his/her personal account to purchase the desired benefits.

Defined-benefit group plans are more complex. In theory, they can either be funded or unfunded, although funded plans are more common in the private sector. In a funded defined-benefit plan, the assets are not segregated into separate accounts for each member. The important feature is the formula used to calculate the pension at retirement. This varies from plan to plan. An example could be the following formula:

\[
Pension = (Service/60) * Final\ salary
\]

“Service” refers to the number of years that the employee has worked for the employer (or has been an active member of the plan).
“Final salary” refers to the employee’s salary over some period close to retirement. Thus, a member with a career service of 40 years would get a pension equal to two-thirds of final salary.

Although the cost of a defined-benefit plan is unpredictable, the employee contributions are usually set at a fixed percentage of salary. The employer then shoulders the burden of uncertainty by paying the balance of the cost of the plan.

In an unfunded plan, the employer contribution is simply the current amount of benefit payments less the employee contributions.

In a funded plan, the employer contribution is periodically estimated by the actuary, and depends on many assumptions, such as:

- the investment return on the fund;
- the growth in employees’ salaries;
- the mortality of pensioners.

Advice given on funding defined benefit plans is probably the most important area of actuarial work in relation to pension plans in U.S. and U.K.

**State Pension Plans**

The importance of state pension plans varies from country to country. In some industrialized countries the state plan has been the main source of retirement income for pensioners, whereas less developed countries may have no state pension plan at all.

Both the U.S. and U.K. have state pension plans, although the trend in both these countries is towards greater provision outside the state system. In many European country as Italy, France and Germany, state plan are the main source of retirement income for pensioners.
In state pension plans, membership is usually *compulsory* for persons working in the country.

Both workers and employers normally pay contributions in the form of social security taxes levied on the earnings of each employee.

Traditionally, state pension plans have been unfunded defined-benefit plans. The pension is often linked to career salary rather than final salary, or may simply be a flat-rate pension for all employees.

Many unfunded state pension plans have become a financial burden because of unfavourable demographic trends in developed countries. Certain countries are phasing out their unfunded defined-benefit plans in favour of compulsory defined-contribution plans. Other countries have transformed their defined benefit plans into so-called Notional Defined Contribution plans, which are pay-as-you go schemes that mimic the mechanism of defined contribution plans.

The future development of state pension systems is likely to move in this direction.

**Defined-Benefit Plans**

The simplest type of defined-benefit plan gives all retired members the same flat-rate pension.

In employer-sponsored defined-benefit plans, there is a strong presumption that the retirement pension should be proportional to the length of service with the employer. The pension can then be seen as a form of deferred remuneration, with the employee earning a defined amount of pension from each year of service.

The simplest benefit formula consistent with this aim would be a pension equal to a fixed monetary income for each year of service. This type of benefit formula is now
unusual, but used to be more common in the U.K. and U.S. before the advent of the high inflation rates of the 1970s.

It is now generally accepted that defined-benefit plans should provide a pension linked to the member’s salary.

**Salary-Linked Benefits**
Reasons for linking benefits to the member’s salary are:

- to protect benefit levels from being eroded by inflation;
- to enable the member to maintain a standard of living in retirement commensurate with that experienced during employment.

**Pensionable salary** is the definition of earnings used for the calculation of benefits and contributions. It often differs from the total remuneration of the employee, possibly because its definition excludes certain categories of pay (e.g., bonuses and overtime pay). In addition, the rules of a plan may apply a fixed deduction in the calculation of pensionable salary, so that:

\[
\text{Pensionable salary} = \text{Basic salary} - \text{Deduction}
\]

The aim of applying such a deduction would be to reduce the pension at retirement by an amount roughly equal to any flat-rate pension provided by the state plan.

Another adjustment to basic salary might be required if the government imposes an upper limit on pensionable salary for tax-approved plans.

**Final Salary Plans**
A final salary plan provides a pension proportional to final pensionable salary, which is the pensionable salary over a defined period close to retirement, typically the year preceding retirement. In some occupations, however, employees’ earnings fluctuate considerably from year to year, especially when bonuses or overtime pay are a significant part of earnings. In these plans, final pensionable salary might be defined as the average pensionable salary over a period of several years prior to retirement.
Some plans allow each salary figure to be revalued by an inflation index up to retirement. The pension formula of a final salary plan is of the form:

\[
Pension = Accrual\ rate \times Pensionable\ service \times Final\ pensionable\ salary
\]

The **accrual rate** varies from plan to plan.

**Pensionable service** is essentially the number of years spent working for the sponsoring employer. It may differ from actual service if the employee has spent some time working for the employer while not a member of the pension plan or if notional service periods are recognized in the pension fund (maternity, military or civil service).

**Career Salary Plans**

A career salary plan provides a pension proportional to some definition of average salary over the member’s period of service. The simplest type of career salary pension formula for an employee retiring with \( N \) years of pensionable service is:

\[
Pension = Accrual\ rate \times (S_1 + S_2 + \cdots + S_N)
\]

where \( S_k \) is the pensionable salary received in the \( k \)th year of service.

A problem with the formula given above is that the earlier salary figures may be worth very little in real terms at retirement. The solution is to revalue each salary figure by an index of wage or price inflation, so that the pension formula becomes:

\[
Pension = Accrual\ rate \times Accrual\ rate \times \left( \frac{S_1}{Q_1} + \frac{S_2}{Q_2} + \cdots + \frac{S_N}{Q_N} \right)
\]

where \( Q_k \) is the value of the inflation index at the end of the \( k \)th year of service.

Career salary benefit formulae are typically found in state pension plans.

**Retirement Benefits**

The normal retirement age is the age at which members can retire with a pension calculated according to the formula given in the rules. But the plan rules are normally
flexible enough to allow members to retire at younger ages, in which case the method of calculating the pension payable on voluntary early retirement must be specified.

There is normally a minimum age for such early retirements.

Defined-benefit plans sometimes provide early retirement pensions based on the formula used for normal retirement. Hence, the same benefit formula would be used at different retirement ages (although members retiring early would generally have smaller pensions because of their lower service and salary at retirement). It is not difficult to show that an early retirement pension calculated in this way is worth more, per year of service, than the pension expected at normal retirement. For this reason, it is usual for a reduction factor to be applied to the normal retirement benefit formula. The calculation of early retirement reduction factors is one of the duties of the plan actuary. These reduction factors are tabulated by age of retirement and depend on actuarial assumptions, such as the discount rate and salary growth.

Similar methods can be used to calculate enhancement factors for members who choose to retire late (i.e., above the normal retirement age specified in the plan rules).

**Ill-Health Retirement**

If an employee must stop working because of ill health, the rules of the plan may provide for an immediate pension based on the member’s salary at the date of stopping work. Most plans provide a more generous pension than would be payable on voluntary early retirement. There is usually no minimum age for ill-health retirement. Many plans include both past service and potential service up to normal retirement age. Another approach would be to provide an ill-health pension equal to a fixed fraction of final pensionable salary, irrespective of actual or potential service. There may also be eligibility conditions related to past service.
The provision of enhanced ill-health retirement benefits creates additional costs for the plan, which must be allowed for by the actuary when recommending a funding strategy.

**Death Benefits**

Although death benefits are generally less costly to provide than pensions, they are an important part of the benefit package and are highly valued by members with dependants. They can be subdivided into those payable on death before retirement and those payable on death after retirement.

**Death before Retirement**

On the death of an active member, the rules of the plan may provide for a lump-sum benefit and/or a pension payable to the deceased member’s spouse (or other dependant). The lump-sum benefit might be a fixed multiple of pensionable salary at death, whereas the spouse’s pension is often based on the same formula used for ill-health retirement multiplied by a “spouse’s fraction.”

The spouse’s pension may be payable for life or may terminate on remarriage.

**Death after Retirement**

Defined-benefit plans usually provide for a spouse’s pension on death after retirement equal to the deceased member’s pension at death multiplied by the spouse’s fraction. This is generally a more costly benefit to provide than the pension on death before retirement.

**Withdrawal Benefits**

The provision of benefits to members who voluntarily leave service before retirement is not normally a high priority for the sponsoring employer.

E.g. until legislation was enacted in 1973, the only withdrawal benefit provided by U.K. plans was a refund of the member’s own contributions (if any). As employee contributions typically cover less than half the cost of funding benefits, such refunds
were poor value compared with the actuarial reserve held for the member prior to leaving the plan.

In both the U.K. and U.S., defined benefit plans must now provide “early leavers” who have completed a minimum period of service with a deferred pension based on salary and service at exit, using the normal retirement pension formula. Unlike the early retirement pension, this benefit does not come into payment until the member reaches normal retirement age.

**Pension Increases**
An increase to pensions is usually granted to protect the real value of pensions from eroding because of inflation. E.g. U.K. legislation specifies a minimum rate for the increase, which is essentially the lower of price inflation and 5% per annum compound.

**Cash Benefits on Retirement**
Pension plans sometimes provide retirement benefits in lump-sum form rather than as income. Depending on the country’s legislation, the member may then have to use all or part of the lump sum to buy a whole-life annuity from an insurance company.

**Member Contributions**
A **contributory plan** is one in which the cost of benefit provision is shared between the active members and the sponsoring employer. In a **non-contributory plan** the cost of benefit provision is met entirely by the employer.

The member contribution rate is usually defined as a fixed percentage of pensionable salary, leaving the employer to meet the balance of the cost of funding the plan.

In addition to compulsory member contributions, plans could also allow active members to pay additional voluntary contributions in order to obtain extra benefits above the basic entitlement set out in the plan rules.
**State Pension Benefits**

The benefits provided by state pension plans often have features that are relatively uncommon in private-sector defined-benefit plans. For example, some social security plans pay a flat-rate pension that is the same for all pensioners. If contributions are linked to earnings, then this implies a redistribution of income towards poorer pensioners.

If the pension is earnings-linked, then it is likely to be based on career-average earnings rather than final earnings. Otherwise, employers could take advantage of the plan by inflating their workers’ salaries just before retirement.

Pensionable earnings are likely to exclude earnings above some upper limit, so that benefits are limited to the coverage of basic needs.

Pension benefits are normally fully protected against inflation.

**Defined Contribution Plans**

*Types of Contribution Formula*

The rules of a defined contribution plan must indicate the method of calculation and the frequency of payment of the contributions allocated to the account of each active member.

In a single-member plan, the contributions are entirely from the individual member, who can usually vary them at will.

In a group defined-contribution plan, it is customary for both the active members and their employer to contribute to the plan, and the rules normally specify a minimum member contribution rate and a more rigidly defined employer contribution rate.

The main types of contribution rate formula are outlined below.
**Fixed Monetary Contribution**
The simplest contribution rate formula provides for a fixed monetary payment into each member’s account. The disadvantage of this approach is that the real value of the contributions will diminish over time if the rate of inflation is positive, making it unlikely that a satisfactory fund will be accumulated at retirement. This method is used mainly for individual pension policies, where the member has discretion to increase the rate of contribution as the need arises.

**Fixed Percentage of Salary**
The most common approach in group defined-contribution plans is for both the active member and the employer to pay fixed percentages of pensionable salary.

**Variable Percentage of Salary**
Another approach used in group defined-contribution plans is for the percentage of pensionable salary paid by the member and the employer to increase with the age or service of the member. As contributions paid close to retirement have less time to accumulate interest, an age-dependent contribution rate could be calculated so as to produce a uniform expected rate of benefit accrual as a fraction of final salary, as in a final salary plan.

**Money Purchase Principle**
Defined contribution plans normally operate on the “money purchase” principle. This means that the money accumulated in the member’s account is used to purchase the same member’s benefits.

The money purchase principle ensures that there are no cross-subsidies between different groups of members (as can occur in a defined-benefit plan) and allows the plan to give its members a degree of choice in the investment of their fund and in the types of benefit they purchase.

The disadvantage for the members is that they are subject to investment and annuity rate risk, making the real value of their future benefits rather unpredictable.
**Retirement Benefits**
On attaining normal retirement age, the member has access to the fund that has accumulated in his or her account.

Depending on the country, legislation may require that all or part of the fund is used to buy a whole-life annuity. If so, the member may be allowed to buy the annuity from the insurer of choice.

The member may also be permitted to choose the type of annuity product purchased.

**Ill-Health Benefits**
Providing ill-health pensions purely on a money purchase basis would imply that the fund accumulated at the date of stopping work should be used to provide the ill-health benefit. This would result in unsatisfactory benefits for most members.

Some defined-contribution plans, therefore, provide additional benefits based on pensionable salary at the date of stopping work.

Alternatively, the sponsoring employer could provide income protection insurance benefits outside the plan by means of a group insurance policy.

**Death Benefits**
A member who requires a spouse’s pension on death after retirement must use part of the fund accumulated at retirement to buy a reversionary annuity, which reduces the money available for the member’s own pension. This is an important difference compared with a defined-benefit plan, as the latter provides the spouse’s pension as an additional benefit.

On death before retirement, the money purchase principle implies that the fund accumulated at death should be used to provide spouse’s benefits. As for ill-health benefits, this would result in benefits far inferior to those typically offered by defined-benefit plans and clearly inadequate for members with little past service. For this reason, many defined-contribution plans provide additional benefits on death before
retirement, sometimes based on pensionable salary at death (as in defined-benefit plans). This is a departure from the money purchase principle and involves extra costs for the sponsoring employer.

**Withdrawal Benefits**
Members who leave service before retirement may receive benefits based on their fund at the date of withdrawal. In some countries, a direct refund may be permitted. Alternatively, legislation may require the plan to provide a deferred benefit based on the fund at exit accumulated up to the normal retirement age (as is the case for Italy).

Usually, if the member changes work, the fund is transferred to the new pension plan which he or she is entitled to join under the new work.

The important feature of the withdrawal benefit in a defined contribution plan is that it is equal in value to the fund accumulated for the early leaver.

Moreover, if the member’s fund is left in the plan, it receives the same rate of accumulation that would have applied if the member had remained in service.

The provision of “portable” benefits is viewed as one of the main advantages of a defined-contribution plan.

**Member’s Pension Choices**
As each active member has an individual account, it is feasible to allow members some degree of investment choice. The usual approach is to allow the member to choose between different investment funds managed by the insurance company contracted to administer the plan.

The other important area of choice is in the type of annuity product purchased at retirement. It is important here to allow the member to choose between different insurance companies, as well as between different types of annuity contract.
**Pre-Retirement Investment Choices**
As the investment risk in a defined-contribution plan is borne by the members, it is desirable for the plan to allow them some control over the investment of their fund. The problem is that many members may lack the expertise to make informed choices. This indicates a need for investment advice as well as investment choice. The approach normally recommended is for members to maximize expected returns when far from retirement and progressively switch into more defensive assets on nearing retirement. This is known as a “lifestyle” investment strategy, often used by defined-contribution plans as the default investment strategy for members who are unable to make their own choices.

**Annuity Choices**
Defined-contribution plans could provide a lump-sum retirement benefit. How this lump sum is utilized depends on the preferences of the retiring member, subject to restrictions imposed by the legislation of the relevant country.

Legislation may require members of tax-approved plans to purchase whole-life annuities in order to ensure that they cannot squander their retirement fund or exhaust their wealth by living too long.

The main aspects of annuity choice for the member relate to the spouse’s reversionary annuity.

Other choices concern the possibility of purchasing certain annuities for a few years (typically 5 or 10) and life annuities to follow, or enhanced annuities (with LTC benefits).

**Income Drawdown**
An alternative to the purchase of an annuity is for the member to draw income from the retirement fund while retaining the freedom to invest the fund in the assets of choice. The main advantage of this approach is that the retirement fund can be
invested in assets offering higher expected returns than those held within annuity funds.

However, the income drawdown approach provides no longevity insurance, this means that higher investment returns are required simply to match the income available from a whole-life annuity. This required extra return, sometimes called “mortality drag,” increases with the age of the member. Attempting to compensate for mortality drag by investing in riskier assets exposes the member to investment risk as well as longevity risk.

In the U.K. as well as in Italy, legal restrictions apply to the level of income that may be drawn from the fund.

Hybrid Plans
Defined-benefit and defined-contribution plans represent opposite extremes in pension plan design.

Investment risk is borne wholly by the employer in a defined-benefit plan and wholly by the members in a defined-contribution plan.

From the members’ point of view, both plans have positive and negative aspects. The flexibility, transparency, and choice in a defined-contribution plan must be weighed against its uncertain benefits. The provision of secure and predictable benefits in a defined-benefit plan must be weighed against the adverse effects of cross-subsidies on particular groups of members (particularly early leavers).

In order to increase the value for employees of the benefits provided by the plan, a hybrid plan that attempts to combine some of the features of defined-benefit and defined-contribution plans could be considered.
**Benefit Underpins**

Plans with benefit underpins provide the greater of two benefits: one calculated on a defined-benefit basis and the other calculated on a defined-contribution basis.

These plans are normally designed so that the higher benefit will usually be of one type (i.e., either defined benefit or defined contribution), with the other type of benefit providing a guarantee or “underpin.”

A defined-contribution plan would provide a defined-benefit underpin to protect retiring members from the extreme consequences of investment risk.

**Cash-Balance Plans**

A cash-balance plan can be thought of as a revalued career salary plan providing a lump-sum retirement benefit.

In the U.S., where these plans are most common, the rate of revaluation is usually linked to the market interest rate on cash instruments rather than an inflation index. This results in a plan that looks like a defined-contribution plan to the members. The effect is the same as allocating a proportion of salary to an individual account and investing it in cash deposits. However, the individual accounts are entirely notional and the member has no investment choice.

Furthermore, there is no requirement to invest the fund in the cash instruments used to determine the revaluation rate. In these circumstances, the sponsoring employer bears the investment risk and must pay extra contributions to amortize any deficits that occur.

As cash-balance plans provide revalued career salary benefits, the cross-subsidies that adversely affect early leavers (and members with low salary growth) in final salary plans are avoided.

The members are exposed to some investment risk, because market interest rates are unpredictable, but usually lower than those from stock-market securities.
As the retirement benefit is a lump sum, retiring members are subject to annuity rate risk, as in a defined-contribution plan, but can also be allowed the same annuity choices.

Although the sponsoring employer bears the risk of adverse experience, as in a defined-benefit plan, these risks are more manageable. The investment risk depends on the extent to which the actual investments of the fund differ from the cash instruments used to determine the revaluation rate.

The provision of lump-sum retirement benefits means that longevity risk is transferred to the members and the career salary benefit structure means that promotional salary increases have no effect on the required contribution rate.